

which the input is coupled to the output of the outer encoder, and

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- c) a recursive inner encoder and a memoryless modulator unit for encoding the interleaved encoded digital information with a recursive inner code and in conjunction therewith memoryless modulating the encoded interleaved encoded digital information onto a carrier, said recursive inner encoder and a memoryless modulator unit having an input and an output of which the input is coupled to the output of the interleaver.

REMARKS

A marked-up version of the rewritten claims is attached hereto.

In brief, the applicant's argument is as follows:

- 1) The present invention requires an inner code applied in the transmitter to be a recursive inner code. It is combined with memoryless modulation.

2) The reference publication of Kobayashi suggests replacing the inner code with a digital modulator. A digital modulator (as in Kobayashi) is not the same as a combination of a recursive inner code and a memoryless modulator (as in the applicant's invention).

3) The reference publication of Benedetto suggests using recursive inner codes, but treats coding separately from modulation.

In order to achieve the present invention by starting from the disclosure of Kobayashi and Benedetto, the person skilled in the art should first work against the explicit teaching of Kobayashi, i.e., re-introduce an inner code although Kobayashi explicitly requires replacing the inner code with just digital modulation. Secondly, the person skilled in the art should select just memoryless modulation as the modulation to be used, and thirdly he should make up for the potential deficiency (coming from the lacking memory of the modulation method) by combining the memoryless modulation with the re-introduced recursive inner code. The fact that modulation and (recursive) inner coding are combined in the invention is against the teachings of both Kobayashi (which suggests that inner code

should be replaced) and Benedetto (which suggests that modulation should be kept separate from coding).

A difference between Kobayashi and the present invention, which a person well versed in the art would appreciate, is the particular need of set partitioning in Kobayashi, while the arrangement according to the present invention could benefit from using set partitioning, but does not expressly require it. The Trellis Coded Modulation scheme employed in Kobayashi irrevocably requires set partitioning to be used, see column 3, lines 32 et seq., in Kobayashi. In the present invention there comes an improvement from iterative processing between an outer error correction code and an "equivalent inner code" formed by a recursive inner code combined with memoryless modulation.

Regarding the decoding phase of Kobayashi, one should especially note that the feedback used therein is not any "extrinsic information like in the iterative (turbo) detection of the present invention, but hard decision symbols and erasures (that were deliberately introduced). The utilization of erasures in Kobayashi does not address modulation memory, or any memory-related features of the coding scheme. Also for this reason it is not obvious that the performance could be enhanced by

introducing memory in the form of a recursive inner code (which inner code, as said above, is completely missing in Kobayashi!).

The independent claims have been amended to recited the memoryless modulating. This combined with the recursive inner code is totally missing from Kobayashi and Benedetto (5/98) even when taken in combination. Thus the rejection of claims 1, 3-5, 10 and 12-14 under 35 USC 103 on these references should be withdrawn.

Similarly, Benedetto (2/98) fails to disclose the above concept. Thus the rejection of claim 6 under 35 USC 103 on these 3 references should be withdrawn.

Hanzo also fails to disclose the above concept. Thus the rejection of claims 2 and 11 under 35 USC 103 should be withdrawn.


Also Valenti fails to disclose the above concept. Thus the rejection of claims 7-9 under 35 USC 103 should be withdrawn.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and

are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

Please charge Deposit Account the amount of \$110.00 for a 1 month extension of time. The Commissioner is hereby authorized to charge payment for any fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,


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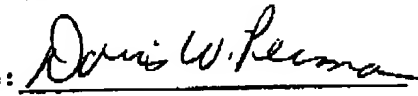
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Application No.: 09/372,331

Marked Up Claim(s)

1. (Amended) A method for transmitting digital information in the form of consecutive symbols over a transmission channel susceptible for intersymbol interference, comprising, in the following order, the successive steps of
 - a) encoding the digital information to be transmitted with an outer code,
 - b) interleaving the encoded digital information to be transmitted,
 - c) encoding the interleaved encoded digital information with a recursive inner code and in conjunction therewith memoryless modulating the encoded interleaved encoded digital information onto a carrier, and
 - d) transmitting the carrier containing the memoryless modulated encoded interleaved encoded digital information.

7. (Amended) A method for transferring digital information in the form of consecutive symbols from a transmitter over a transmission channel susceptible for intersymbol interference to a receiver, comprising, in the following order, the successive steps of
- a) encoding the digital information to be transmitted with an outer code,
 - b) interleaving the encoded digital information to be transmitted,
 - c) encoding the interleaved encoded digital information with a recursive inner code and in conjunction therewith memoryless modulating the encoded interleaved encoded digital information onto a carrier, and
 - d) transmitting the carrier containing the memoryless modulated encoded interleaved encoded digital information,

- e) receiving the transmitted carrier containing the memoryless modulated encoded interleaved encoded digital information,
- f) producing an estimate of the characteristics of the transmission channel,
- g) converting the received carrier into consecutive symbols in a SISO equalisation process using the produced estimate of the characteristics of the transmission channel,
- h) deinterleaving the consecutive symbols, and
- i) decoding the deinterleaved consecutive symbols in a SISO decoding process.

10. (Amended) A transmitter for transmitting digital information in the form of consecutive symbols over a transmission channel, comprising

- a) an outer encoder for encoding the digital information to be transmitted with an outer code, said outer encoder having an input and an output,

- b) an interleaver for interleaving the encoded digital information to be transmitted, said interleaver having an input and an output of which the input is coupled to the output of the outer encoder, and
- c) a recursive inner encoder and a memoryless modulator unit for encoding the interleaved encoded digital information with a recursive inner code and in conjunction therewith memoryless modulating the encoded interleaved encoded digital information onto a carrier, said recursive inner encoder and a memoryless modulator unit having an input and an output of which the input is coupled to the output of the interleaver.